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Sertifikaat

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REPUBLIEK VAN SUID-AFRIKA

Certificate

PATENTKANTOOR

PATENT OFFICE

DEPARTEMENT VAN HANDEL
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REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF TRADE
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- 1) South African Patent Application No. 99/5930 accompanied by a Provisional Specification was filed at the South African Patent Office on the 15 September 1999, in the name of Potchefstroom University for Christian Higher Education in respect of an invention entitled: "Low noise amplifier arrangement".
- 2) The photocopy attached hereto is a true copy of the provisional specification and drawings filed with South African Patent Application No. 99/5930.

Geteken te
Signed at

PRETORIA

in die Republiek van Suid-Afrika, hierdie
in the Republic of South Africa, this

3rd dag van
day of

October 2000



J. Schönborn
Registrateur van Patente
Registrar of Patents

REPUBLIC OF SOUTH AFRICA		REGISTER OF PATENTS		PATENTS ACT, 1978	
				P/99/77415	
OFFICIAL APPLICATION NO.		LODGING DATE : PROVISIONAL		ACCEPTANCE DATE	
21	01	22	15-09-1999	43	
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51		23		47	
FULL NAME(S) OF APPLICANT(S)/PATENTEE(S)					
71	POTCHEFSTROOM UNIVERSITY FOR CHRISTIAN HIGHER EDUCATION				
APPLICANTS SUBSTITUTED:			DATE REGISTERED		
71					
ASSIGNEE(S)			DATE REGISTERED		
71					
FULL NAME(S) OF INVENTOR(S)					
72	1. VISSER, Barend 2. DE JAGER, Ocker Cornelis				
PRIORITY CLAIMED		COUNTRY		NUMBER	
N.B. Use International abbreviation for country. (See Schedule 4)		33		31	
				32	
TITLE OF INVENTION		LOW NOISE AMPLIFIER ARRANGEMENT			
54					
ADDRESS OF APPLICANT(S)/PATENTEE(S)					
Hofmann Street Potchefstroom					
ADDRESS FOR SERVICE			DMK		
74	D.M. KISCH INC., SANDTON		P/99/77415		
PATENT OF ADDITION NO.		DATE OF ANY CHANGE			
61					
FRESH APPLICATION BASED ON		DATE OF ANY CHANGE			

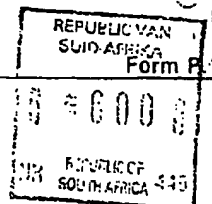
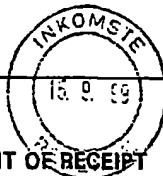
D.M. KISCH INC. , Johannesburg

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT

(Section 30 (1) - Regulation 22)

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate.



PATENT APPLICATION NO.		AGENT'S REFERENCE	
21	01	P/99/77415	

FULL NAME(S) OF APPLICANT(S)	
71	POTCHEFSTROOM UNIVERSITY FOR CHRISTIAN HIGHER EDUCATION

ADDRESS(ES) OF APPLICANT(S)		REGISTRAR OF PATENTS, DESIGNS, TRADE MARKS AND COPYRIGHT
Hofmann Street Potchefstroom		1999-09-15

TITLE OF INVENTION	
54	LOW NOISE AMPLIFIER ARRANGEMENT

THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. The earliest priority claimed is	
THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.	
21	01
THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO.	
21	01

THIS APPLICATION IS ACCOMPANIED BY :	
X	1 A single copy of a provisional xxxxxx complete specification of 6 pages.
X	2 Drawings of 2 sheets.
	3 Publication particulars and abstract (Form P.8. in duplicate).
	4 A copy of Figure of the drawings for the abstract.
	5 An assignment of invention.
	6 Certified priority document(s) (State number).
	7 Translation of priority document(s).
	8 An assignment of priority rights.
	9 A copy of Form P.2 and specification of S.A. Patent Application No. 21 01
	10 A declaration and power of attorney on Form P.3.
	11 Request for ante-dating on Form P.4.
	12 Request for classification on Form P.9.
	13

DATED THIS 15 th DAY OF September 19 99

Patent Attorney for the Applicant(s)

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OFFICIAL DATE STAMP
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REGISTRAR VAN PATENTE, MODELLE, HANDELSMERKE EN OUTEURSREG

D.M. KISCH INC. , Johannesburg

*Patent Attorneys & Trademark Agents
Attorneys & Notaries*

Form P.6

REPUBLIC OF SOUTH AFRICA

PATENTS ACT, 1978.

PROVISIONAL SPECIFICATION

(Section 30 (1) - Regulation 27)

PATENT APPLICATION NO.		LODGING DATE.		AGENT'S REFERENCE
21	01	995930	22	15-09-1999
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FULL NAME(S) OF APPLICANT(S)	
71	POTCHEFSTROOM UNIVERSITY FOR CHRISTIAN HIGHER EDUCATION

FULL NAME(S) OF INVENTOR(S)	
72	1. VISSER, Barend 2. DE JAGER, Ocker Cornelis

TITLE OF INVENTION	
54	LOW NOISE AMPLIFIER ARRANGEMENT

INTRODUCTION AND BACKGROUND

THE invention relates to amplifiers and more particularly to low noise amplifiers.

5 It is well known that in small signal applications, noise contributed by an amplifier could overpower the small signal.

OBJECT OF THE INVENTION

Accordingly it is an object of the present invention to provide an amplifier
10 arrangement with which the applicant believes the aforementioned disadvantages may at least be alleviated.

SUMMARY OF THE INVENTION

According to the invention there is provided an amplifier arrangement
15 including an input and an output and a plurality of amplifier stages connected between the input and the output such that the stages collectively provide at the output a correlated summation of a signal at the input and an uncorrelated summation of noise.

20 The amplifier stages may be spaced along a transmission line arrangement extending between the input and the output.

The amplifier stages may be connected to feed off the transmission line arrangement and may be connected in parallel with one another.

5 In another embodiment the amplifier stages may be connected in respective transmission lines, the respective transmission lines having respective suitable lengths.

BRIEF DESCRIPTION OF THE ACCOMPANYING DIAGRAMS

10 The invention will now further be described, by way of example only, with reference to the accompanying diagrams wherein

figure 1 is a diagrammatic representation of a first embodiment of the amplifier arrangement according to the invention;

figure 2 is a diagrammatic representation of a second embodiment of the arrangement; and

15 figure 3 is a diagrammatic representation of a third embodiment of the arrangement wherein the outputs of amplifier stages are connected to a two-dimensional surface.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

20 In figure 1, a first embodiment of the amplifier arrangement according to the invention is generally designated by the reference numeral 10.

The arrangement 10 is connected as a pre-amplifier arrangement to main amplifier 12. The arrangement includes first and second transmission lines 14 and 16 in the form of co-axial cables. Cable 16 provides at one end thereof an input 18. The other end of cable 14 constitutes output 19 of the arrangement which output is connected to an input of the main amplifier 12. The arrangement further includes a plurality of amplifier stages 20.1, 20.2, 20.3 and 20.4 connected in parallel between lines 14 and 16. The amplifier stages 20.1 to 20.4 may each include a transistor (not shown) connected in common emitter configuration and the main amplifier 12 may include a transistor (also not shown) connected in common base configuration.

The amplifier stages 20.1 to 20.4 are spaced such relative to one another that they collectively provide at the output 19 a correlated summation of an input signal applied at input 18. They also provide an uncorrelated summation of noise signals. It is believed that the spacing between adjacent amplifiers should be less than 0,25 of the wavelength of the input signal. The effect is that the input signal, which may be a very small signal, is amplified by the correlated summation and that noise is substantially cancelled by the uncorrelated summation.

In figure 2, there is shown another configuration of the amplifier arrangement designated 30. In this embodiment strip lines are utilized.

The lengths of strip lines 32.1 to 32.4 extending between input 34 and output 36 are selected such that the amplifier stages 38.1 to 38.4 collectively provide at the output 36 a correlated summation of an input signal applied at input 34 and at the same time a mutually destructive uncorrelated summation of noise signals.

In figure 3, a further embodiment of the arrangement is shown designated 40. In this embodiment the outputs of the amplifier stages 20.1 to 20.4 are spaced from one another a distance (l) which is less than $\frac{1}{4}$ of the wavelength (λ) of a signal applied at input 42. The outputs are connected to a two-dimensional conductive surface 44. The output of the

arrangement 40 is provided at 46 between opposed conductive surfaces 44 and 48. A correlated summation of an input signal applied at input 42 is available at output 46. Suitable termination elements (not shown) may be applied to the arrangement 40 to dissipate noise. It is believed that a two dimensional arrangement (as shown in figure 3) may have better signal to noise characteristics than a one dimensional arrangement (as shown in figure 1).

Thus, it is envisaged that arrangements having two-dimensional (surface technology) or three-dimensional (volume technology) input arrangements and/or two-dimensional or three dimensional output arrangements also fall within the scope of the invention.

It will be appreciated that there are many variations in detail on the amplifier arrangement according to the invention without departing from the scope and spirit of this disclosure.

Dated this 15 day of September 1999



Patent Attorney/Agent for the Applicant

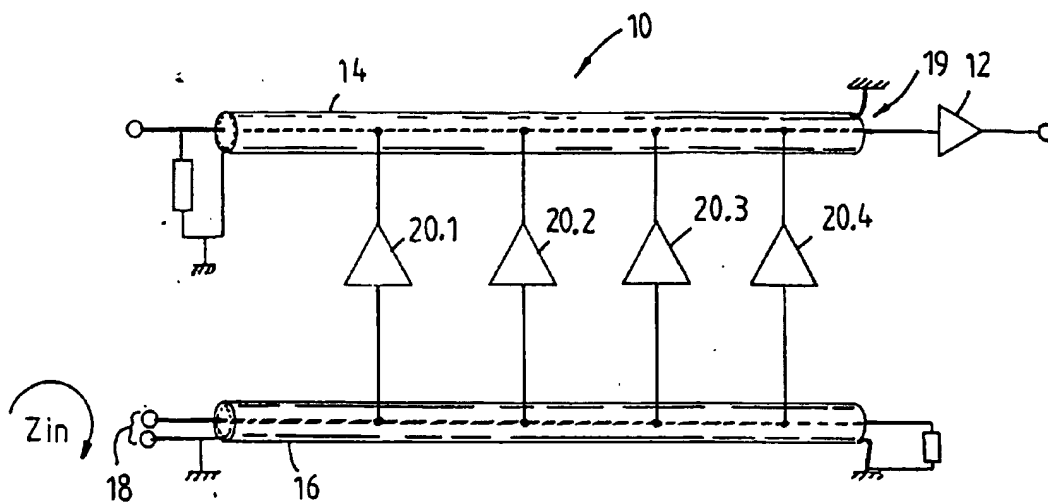


FIGURE 1

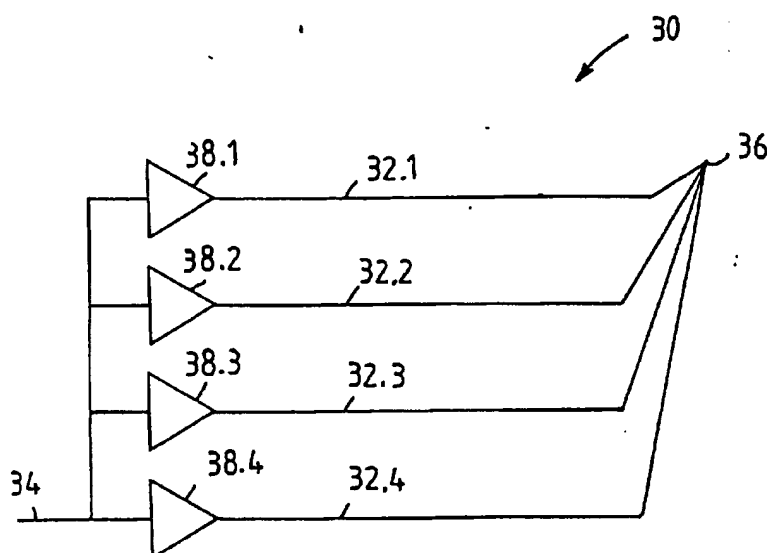


FIGURE 2

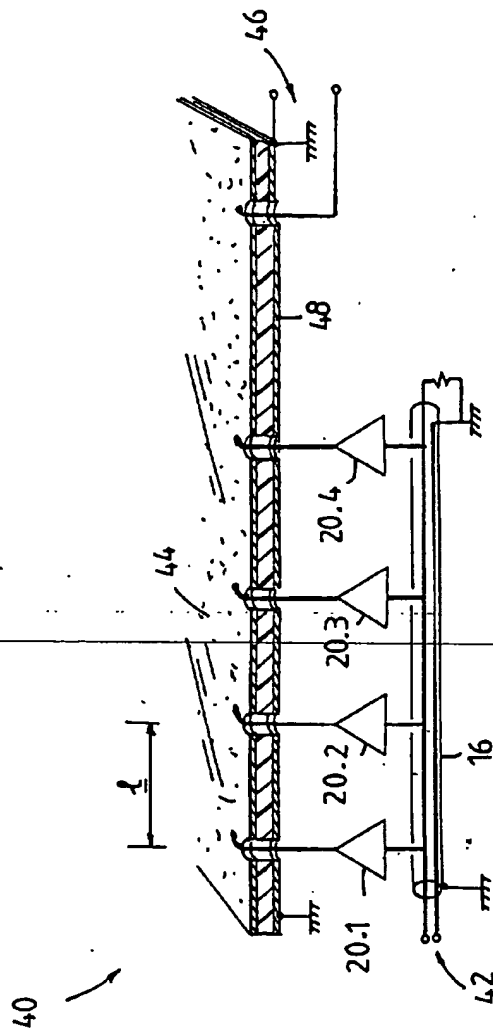


FIGURE 3

